IMPACT OF COVID-19 ON THE FINANCIAL STABILITY OF COMMERCIAL BANKS IN KENYA

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A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF APPLIED ECONOMICS, IN THE SCHOOL OF BUSINESS, ECONOMICS, AND TOURISM IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF ECONOMICS (FINANCE) OF KENYATTA UNIVERSITY

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DECLARATION

This research project is my original work and has not been presented in any other university for the award of any degree.

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This project has been submitted with my approval as University Supervisor

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DEDICATION

This research proposal I devote to my father Morris, my mother Agnes, and my brother Benson.

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My acknowledgment goes to God Almighty for granting me the means to pursue this research project. Special thanks go out to my supervisor Dr. Joseph Muniu for his unwavering guidance and my brother Benson for financing me.

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ABBREVIATIONS

2SLS-IV	Two Stage Panel Least Squares-Instrumental Variables
2SGMM	Two Step System Generalized Method of Moments
BCBS	Basel Committee on Banking Supervision
CAMELS	Capital adequacy, asset quality, management soundness, earnings and profitability, liquidity, and sensitivity to market risk
CBK	Central Bank of Kenya
CBR	The Central Bank Rate
CMA	Capital Markets Authority
COVID-19	Coronavirus Disease
DFI	Digital Financial Inclusion
ECB	European Central Bank
FIH	Financial Instability Hypothesis
FKE	Federation of Kenya employees
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GMM	Generalized Method of Moment
GOK	Government of Kenya

IMF	International Monetary Fund
IRF	Impulse Response Functions
KBA	Kenya Bankers Association
KNBS	Kenya National Bureau of Statistics
KRA	Kenya Revenue Authority
LLC	Levin-Lin-Chu
MOH	Ministry of Heath Kenya
MPC	Monetary Policy Committee
NPL	Non-Performing Loan
OLS	Ordinary Least Squares
PAYE	Personal Income Tax Pay As You Earn
P-VAR	Panel vector autoregression
QAT	Qualitative asset transformation
REM	Random effects model
ROA	Return on Assets
ROE	Return on Equity
SMEs	Small and Medium Sized Enterprises
UNCTAD	United Nations Conference on Trade and Development
WHO	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Capital Buffer	Denotes capital that banks retain over the minimum statutory requirements set by the regulator of banking institutions to decrease the likelihood of them failing to meet the set standards.
Commercial banks	Financial institutions that accept deposits, give loans, and invest the deposits.
COVID-19	The global respiratory disease that affected the whole world in 2020 and 2021.
Economic Shock	Any unprecedented event that affects commercial banks either directly or indirectly, such as the COVID-19 pandemic.
Financial intermediation	The process by which commercial banks link surplus and deficit units.
Financial stability	Capability of commercial banks to cope with economic shocks and turbulences while carrying out financial intermediation processes smoothly. Financial stability was assessed using Z-score.
Government Policy Response	Fiscal and monetary measures implemented by the government to mitigate the economic impacts of COVID-19 enacted between 2020 and 2021 quantified by number and type.

Pandemic Duration This is the period between March 2020 and December 2021 during which COVID-19 was officially declared a global pandemic by the World Health Organization and affected global economies.

Z-score A measure of commercial banks' probability of insolvency.

ROA Represents the percentage of profit/loss before tax divided by total assets.

ROE Percentage of profit/loss before tax divided by total shareholders' funds.

ASSET QUALITY Percent of the Gross non-performing loans divided by total loans.

Capital Adequacy Core Capital to Total Deposits of commercial banks expresses as a percent.

ABSTRACT

Countries worldwide were gripped by the COVID-19 pandemic for the greater part of 2020 and 2021. COVID-19 spread to virtually all nations around the globe causing contraction in the global economy and Kenya was no exception. Governments worldwide deployed social distancing, lockdowns, and curfews, resulting in employee lay-off, business closure, and suppressed demand for commodities and services eventually trickling down to commercial banks. The Kenyan banking sector experienced deterioration in asset quality which has been worsening since 2014 when it stood at 5.6 percent, reaching an all-time high of 14.5 percent in 2020, whereas Return on Assets which has also been declining since 2014 stood at 4.46 percent dropped to a record low of 2.07 percent in 2020 during the pandemic. Therefore, the researcher sought to establish how the COVID-19 shock has impacted the financial stability of Kenyan commercial banks. The study sought to specifically establish how the COVID-19 pandemic impacted both Z-score and capital adequacy of Kenyan commercial banks. The study was anchored on the financial intermediation theory, capital buffer theory, and the financial instability hypothesis. A non-experimental research design was embraced while the financial stability proxy was Z-score. The study targeted 19 commercial banks in Kenya between the years 2015 to 2022 which had complete data on all the study variables. Annual bank-level secondary data was acquired from Kenya`s Central Bank annual reports of supervision from 2015 to 2022. The event study methodology was used while collecting data whereby, the event window was 2020 to 2021, the span before the event (COVID-19) was 2015 to 2019, and the spell after the event was 2022. The study embraced a panel vector autoregression methodology for data analysis whereby, impulse response functions were generated. The outcome of the impulse response functions revealed a negative impact of COVID-19 on both Z-score and capital adequacy. Based on the study findings, the Government of Kenya ought to institute non-disruptive pandemic control measures such as practicing proper hygiene and wearing of masks as opposed to quarantines and lockdowns which are detrimental to businesses ultimately leading to a decline in income for commercial banks. Moreover, since capital acts as a shock absorber for banks, Kenyan commercial banks should strive to achieve and maintain the minimum capital adequacy ratios set by the Central Bank of Kenya. This will ensure commercial banks in Kenya cushion themselves against economic shocks generated by pandemics such as COVID-19.

CHAPTER ONE

INTRODUCTION

1.1 Background

The occurrences of pandemics aren't new phenomena rather, they have occurred throughout human history at different periods (Ferguson et al., 2020). Wuhan Province China is mostly attributed to the initial occurrence of COVID-19 in December 2019 (World Health Organization (WHO), 2020). From Wuhan, COVID-19 spread to the rest of the world at an alarming rate. The pandemic caused widespread destruction due to its communicable and highly infectious nature (Zaremba et al., 2020). On 11th March 2020, the WHO (2020) declared that COVID-19 a global epidemic. Governments worldwide implemented various epidemiology interventions such as keeping a safe distance and partial lockdowns to contain COVID-19 (Fong et al, 2020). With these regulations, economic activities such as trading and banking became particularly hard to undertake.

Globally, the world economy contracted by 3.5 percent (International Monetary Fund (IMF, 2021). The severity of COVID-19 is expected to be greater in comparison to the 2007 and 2008 global financial crisis (IMF, 2020). The economic, health, and social implications of COVID-19 resulted in the World Bank deployment of a total of $157 billion from April 2020 to 2021 (World Bank, 2021). Governments worldwide utilized monetary and fiscal policy support amounting to $11 trillion to stop the economic havoc and save lives brought about by COVID-19 as of September 2020 (IMF, 2021).

Regionally, Africa experienced a contraction of 3.4 percent in real GDP in 2020 (United Nations Conference on Trade and Development (UNCTAD), 2021). Sub-Saharan Africa experienced its

first recession in 25 years due to COVID-19 leading to a worsening public debt vulnerability, plunging up to 40 million people into extreme poverty, and ultimately undoing years of advancement in eradicating poverty (World Bank, 2021). The Real Gross Domestic Product (GDP) contractions in both Africa and sub-Saharan Africa were less severe than in other parts of the globe due to factors such as the slow advancement of the disease, the quick recovery of commodity prices, and the growing use of digital technology in manufacturing which has increased employment opportunities (World Bank, 2021).

Locally, the Kenyan economy in 2020 experienced a 0.3 percent decline in Real Gross Domestic Product (GDP) (Kenya National Bureau of Statistics (KNBS), 2021). Despite the decline being experienced throughout the economy, it was more profound in the housing, hotels, education, and service sectors (KNBS, 2021). Inflation increased from 5.3 to 5.4 percent in 2019 and 2020 respectively and the manufacturing sector declined by 0.1 percent in 2020 (KNBS, 2021). The Federation of Kenya Employees (FKE) survey of 2020 which sampled 122 organizations in the production and processing, banking, and insurance institutions survey revealed that an average of 33 workers lost their jobs between 29th February 2020 and 1st August 2020 due to COVID-19 (FKE, 2020).

The key difference between COVID-19 and earlier crises, as highlighted by Laeven et al. (2020) and Brunnermeier & Krishnamurthy (2020), is the magnitude of the shock to particular industries. The COVID-19 pandemic affected all people irrespective of their nationality, race, color, religion, and gender (Cuesta & Pico, 2020). According to Azarova & Mier (2020), COVID-19 triggered a global exogenous shock. COVID-19 generated demand and supply shock with the capacity to evolve into a depression (IFC, 2021). The banking sector is anticipated to undertake a huge function of taking up economic disturbances generated by the pandemic by availing loans

(Acharya & Steffen, 2020; Borio,2020). Across nations, due to the immediate shock of COVID-19, lockdowns and social isolation policies were instituted as a means to stop COVID-19, manufacturing stopped, the need for commodities was shut down entirely or in part, and transportation locally and globally was severely restricted (Barua, 2020a; 2020b). Similar to the 2008 financial crisis, commercial banks are bound to have some turbulent times ahead because of the pandemic.

Coronavirus causes the Coronavirus disease commonly known as COVID-19 formerly 2019-nCoV (United Nations International Children's Emergency Fund (UNICEF), 2020). COVID-19 being highly infectious spread to all nations eventually reaching Kenya. As stated by the Centre for Disease Control (CDC, 2020), COVID-19 manifests through signs that include chills, coughing, strenuous inhalation and exhalation, sore throat, and running nose. Evidence from WHO (2020) shows that COVID-19 is an airborne disease with the primary modes of transmission being through respiratory droplets from infected individuals and contact routes.

COVID-19 resulted in 6,650,433 casualties globally, 1,567,155 in North America, 1,965,073 in Europe, 1,500,768 in Asia, and 258,146 in Africa as of December 2022 (Worldometre, 2022). UNICEF (2022) argues that the case for fewer infections and deaths in Africa unlike in North America, Asia, and Europe is a result of a younger population and a favorable climate. The virus is more infectious in cold climates rather than warm climates and also less prevalent in young people as compared to old people. Other than using lockdowns and quarantines to control the pandemic, authorities worldwide rolled out mandatory testing and wearing of masks.

Kenya`s first known case of COVID-19 was on 12th March 2020 (Ministry of Health Kenya (MOH, 2020). Confirmed deaths in Kenya as of November 2022 were 5,680 (MOH,2022). The Kenyan government in conjunction with the health ministry introduced social distancing, travel

restrictions, curfews, lockdowns, and suspension of public gatherings (MOH, 2020). Tackling the aftermath of COVID-19 in Kenya led to policy measures such as Pay As You Earn and corporate income tax being both reduced by 5 percent from 30 percent to 25 percent while individuals with an income up to Ksh. 24,000 received 100 percent tax relief (Kenya Revenue Authority (KRA), 2020). Working from home initiative was also adopted by various companies around the country where the main aim was to halt the pandemic and allow companies to carry out their day-to-day operation.

1.1.1 Commercial Banks in Kenya

Banks carry out banking business which involves, receiving public finances in terms of deposits, lending, and investing the deposited money (Banking Act, 2015). The banking sector in Kenya employs over 1.5 million people and contributes 7.7 percent to gross domestic product (Bloom et al., 2018). The Central Bank of Kenya (CBK) is a corporation tasked with making guidelines for financial institutions to abide by and facilitate a sound and well-functioning banking system. The Kenyan banking sector comprised of 39 Commercial as of 30th September 2022 (CBK, 2022). Kenya Bankers Association (KBA) is a crucial body in the Kenyan commercial bank sector which is the umbrella body of the 46 organizations given authority and modulated by the CBK (KBA, 2022).

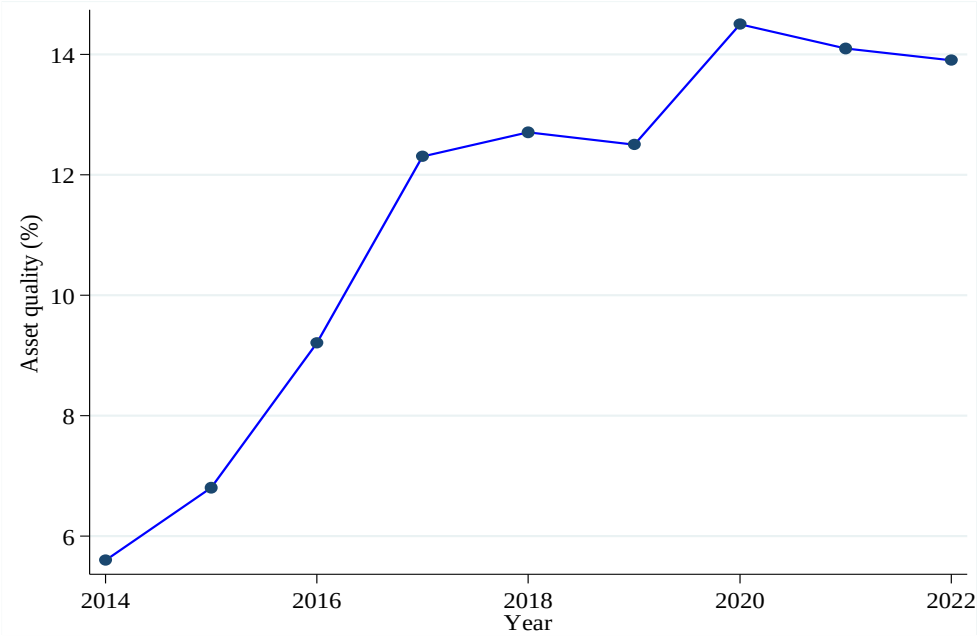

Figure 1.1 Kenyan commercial banks` Trends in Asset Quality

Source: Author computation

As illustrated in Figure 1.1, asset quality (percentage of gross non-performing loans to gross loans) was 5.6 percent in December 2014 (CBK, 2014). Delayed payment to suppliers and a challenging business environment led to a decline in asset quality from 5.6 to 6.8 percent in December 2014 and December 2015 respectively (CBK, 2015). In 2016 asset quality deteriorated from 6.8 percent in December 2015 to 9.2 percent (CBK, 2016) due to reclassification of loans. Asset quality worsened by 3.1 percent from 9.2 to 12.5 percent in December 2016 and December 2017 proportionately due to bad weather coupled with uncertainties caused by elections (CBK, 2017). In 2018, asset quality declined to 12.7 percent from 12.3 in 2017 resulting from late remittances by privately owned enterprises and boorish mortgages (CBK, 2018).

The year 2019 saw Asset quality improve marginally by 0.2 percent from 12.7 to 12.5 percent in December 2018 and 2019 December respectively (CBK, 2019). As the COVID-19 pandemic ravaged the economy causing staff layoffs, slow business activities, and business closure, asset quality worsened to 14.5 from 12.5 percent in 2020 and 2019 respectively (CBK, 2020). In 2021, Asset quality improved by 0.4 percent to 14.1 from 14.5 percent in December 2020 mainly due to improved business activities due to recovery from COVID-19. An improvement in asset quality was noted in December 2022 when asset quality ameliorated to 13.9 percent against 14.1 percent in 2021 December due to better merchandising and an economic upswing. Stability necessitates banks to keep quality assets to ensure financial stability, failure to could result in financial fragility and crisis (Vigneswara, 2015).

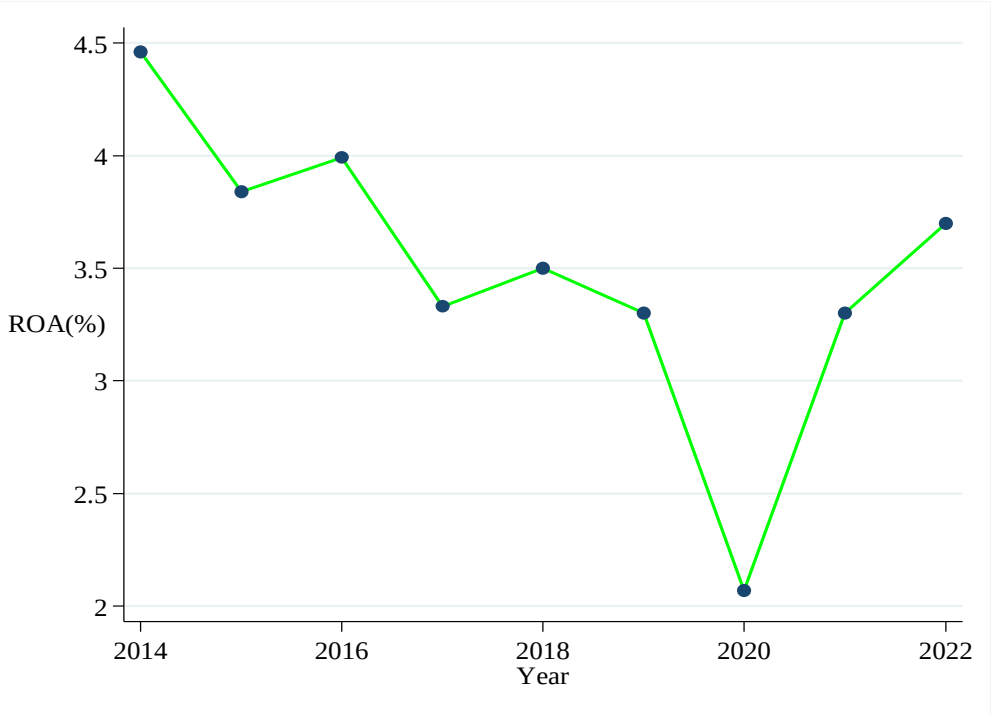

Figure 1.2: Kenyan commercial banks` trends in Return on Assets (ROA)

Source: Author computation

As illustrated in Figure 1.2, Return on Assets (ROA) calculated as the percentage of profit/loss before tax divided by total assets was 4.46 percent in 2014 (CBK, 2014). In 2015 ROA declined to 3.84 percent as commercial banks` income fell due to a slower growth in credit in 2015 by 11.6 percent compared to 22.9 percent in 2014 (CBK, 2015). ROA improved in the year 2016 to 3.99 percent from 3.84 percent in 2015 which was attributed to commercial banks' income increasing by 5.7 percent in 2016 in contrast to expenses increasing by 3.8 percent over the same period (CBK, 2016). ROA declined to 3.3 percent in 2017 attributed to a 9.6 percent decline in pretax profits (CBK, 2017). In 2018, ROA improved to 3.5 percent following a 14.6 percent increment in profit before tax (CBK, 2018).

Growth in expenses by 4.9 percent in 2019 resulted in ROA declining to 3.3 percent (CBK, 2019). Following the outbreak of COVID-19, the ROA dropped to 2.07 percent as pretax profits decreased by 29.5 percent in 2020 (CBK, 2020). Bank`s ROA increased to 3.3 percent in 2021 following an increase of 75.7 percent in pretax profits (CBK, 2021). In the year 2022, ROA improved to 3.7 percent following an increase of 22.0 percent in profits before tax (CBK, 2022). ROA is a profitability measure for commercial banks. A stable and profitable banking industry is better suited to handle the crisis (Vigneswara, 2015).

1.1.2 Financial Stability

The measurement, indicators, and quantification of financial stability are not widely agreed upon (Segoviano & Goodhart, 2009; Gersl & Hermanek, 2010). Therefore, there are numerous definitions and measures of financial stability. A financial system that can cope with distress and mitigate any possible disruptions in the financial intermediation is considered stable (ECB, 2012). When the essential elements that form a banking ecosystem are operational, financial system is said to exhibit financial stability (Crawford et al., 2018). As stated by Gadanecz & Jayaram (2009),

financial soundness is experienced in the financial sector when excessive volatility and crisis are absent. Ryan (2017) posits that a stable financial system can allocate resources effectively and absorb shocks while minimizing the negative impacts on other financial systems and the economy.

The financial stability of individual institutions is based on the Z-score, whereas another better-known variable is the non-performing loan ratio (asset quality) (World Bank, 2016). The IMF, (2006), put forward several variables for measuring financial soundness, namely; Capital to assets ratio and asset quality. As stated by Roman & Argu (2013) and Christopoulos et al. (2011), capital adequacy, asset quality, management soundness, earnings and profitability, liquidity, and sensitivity to market risk (CAMELS) have been employed to gauge the financial soundness of United States banks since 1979. According to Ghosh (2008), Beck et al. (2009), and Mostak & Sushanta (2015), individual banking organizations have employed Z-score and asset quality to assess financial stability using accounting data. Enhancing the soundness of banking institutions around the globe has been a priority for the Basel Committee on Banking Supervision (BCBS) (Kouser et al., 2011). The emphasis on strengthening the crucial internal elements of the financial system is a recurring theme in all three accords (Basel I, II, and III accords). The Basel Accords aim to achieve financial soundness in the sector by setting minimal requirements for crucial endogenous (internal) elements that financial corporations should adhere to (BCBS, 2012).

Alexandru and Romanescu (2008) asserted that the stability of a financial institution can be undermined by both internal factors within the institution and external factors, such as economic shocks. Economic policies, macroeconomic factors, and external surroundings may be sources from which shocks may originate from (Azam & Siddiqoui, 2012). Firm characteristics fall under the category of internal factors (endogenous variables) while the external elements (exogenous variables) are categorized as the external operational environment (Azam & Siddiqoui, 2012).

When evaluating a commercial bank's financial stability, particular attention should be given to exogenous elements and endogenous aspects that affect the bank's functioning (Brauers et al., 2014).

The stability of commercial banks is predominantly evaluated through metrics like the Z-score and asset quality. Z-score, which incorporates equity to total assets (ETA), return on assets (ROA), and standard deviation of ROA, provides a more precise assessment of the likelihood of bank failure (Ciha'ki et al., 2016). Z-score served as the proxy for assessing the financial stability of commercial banks in this study.

1.1.3 Financial Stability and COVID-19

The issue of whether financial organizations will be able to continue providing intermediation services has become a point of contention since the onset of COVID-19 (Beck, 2020; Cecchetti & Schoenholtz, 2020). The pandemic has increased loan default rates, created difficulty and complex loan recoveries, reduced the availability of funds to loan, and suppressed new investment demands (Baker et al., 2020). A decline in loan growth has been attributed to COVID-19, especially in the small banks that make low profits and have high non-performing assets (Colak & Oztekin, 2021). According to Li et al. (2021), banks tend to experience constrained growth of loans and earnings during pandemics.

Cost-effectiveness, stock market valuations, and financial stability of banks have all drastically declined due to COVID-19 (Elnahass et al., 2021). As governments worldwide continue to use social distancing and lockdown tactics, spillover impacts from other sectors of the economy will reach commercial banks in the form of declining earnings and a rise in non-performing loans (Duan et al., 2021). Broad and diverse complications have been brought about by COVID-19 which have resulted in varied consequences for baking institutions' financial soundness (Aldasoro et al., 2020).

COVID-19`s economic shock poses a greater risk of default for individuals and businesses who borrow from banks (Vidovic & Tamminaina, 2020). Shocks emanating from the pandemic have generated revenue disruptions, particularly in developing and emerging nations where banks are mostly dependent on loans for their business portfolio (Barua. 2021). Banks are extremely susceptible to disturbances in the economy and therefore in case of insolvency during the COVID-19 pandemic, a major economic turmoil would ensue (Cecchetti & Schoenholtz, 2020). Banks globally experienced low loan repayments originating from business closures and lockdowns during the pandemic (Elnahass et al., 2021). Periodic episodes of financial instability have typically been attributed to external shocks or other types of abnormal occurrences (Kindleberger, 1978; Minsky, 1977, 1982).

Locally, the Monetary Policy Committee (MPC) in March 2020 deliberated on several policy initiatives to stop the COVID-19 crisis from turning into a serious economic and financial crisis. The Cash Reserve Ratio (CRR) and the Central Bank Rate (CBR) were both lowered by one percent from 5.25 percent to 4.25 percent and 8.25 percent to 7.25 percent respectively to assist distressed borrowers amidst the pandemic (MPC, 2020). Moreover, CBK implemented policy measures that commercial banks utilized to mitigate the unfavorable economic implications their customers may accrue from COVID-19. These measures included the provision of relief on personal loans to borrowers by extending their loans to a period of up to one year, Medium-sized businesses (SMEs), and corporate borrowers debt assessment and restructuring depending on their unique pandemic-related circumstances (CBK, 2020). These policy measures were meant to maintain the financial soundness of Kenyan banks amidst the pandemic.

1.2 Statement of the problem

Banking system operations have been immensely derailed in times of global crises such as; the Asian crisis in 1997 (King, 2001; Zhuang & Dowling, 2002) and the financial crisis between 2007 and 2008 (Aisen & Franken, 2010 and Williams, 2010)**.** The Asian crisis was caused by **a** lack of effective prudential regulation and supervision of the banking system, whereas the 2007 to 2008 financial crisis was caused by the mortgage crisis. These global crises have highlighted the importance of financial stability due to the havoc they caused in the respective countries and the world at large. Ratnovski (2013) argues that banking institutions facilitate economic growth and development by enhancing financial intermediation efficiently. Financial instability inflicts hefty costs on financial institutions with a plausible domino impact on an economy possibly leading to the failure of the financial institutions as a consequence of financial systems becoming volatile (Vlahović, 2014).

Despite MPC and CBK policy implementations in 2020, asset quality which has been on an increasing trend since 2014 deteriorated to a record high of 14.5 percent, whereas ROA has also been declining since 2014 dropped to a historic low of 2.07 percent during the pandemic (CBK, 2020). The decline in asset quality is way above the ideal threshold of the non-performing loans ratio of 5 percent (Dayong et al, 2015). This sharp decline in both ROA and asset quality was largely attributed to quarantines, lockdowns, and business closures. Moreover, the financial and insurance sectors laid off an average of 33 employees per organization to alleviate themselves from the detrimental impact of the pandemic (FKE, 2020).

There exists some empirical literature on financial stability and COVID-19. These include Elnahass et al. (2021, Riadi et al. (2022), Siti et al. (2022), Sunarsih et al. (2022), Ozsoy et al. (2022), Arafat et al. (2021), and Banna et al. (2022). However, these studies were cross-country

studies and country-level studies done in other nations. More importantly, there seems to be no coherence in the outcomes which range from negative impact to positive impact and no impact. Moreover, the inquest into how the financial stability of Kenyan commercial banks has been impacted by COVID-19 remains largely unexplored to the best of the researcher`s knowledge. Inquiries made in Kenya include Ochenge (2022) and Kimundi (2022), which don't explicitly explore how the financial stability of Kenyan commercial banks has been impacted by COVID-19. Therefore, the investigation into how Kenyan commercial banks' financial stability has been impacted by COVID-19 shock while utilizing the panel vector autoregression (P-VAR) analysis is necessary.

1.3 Research Questions

i. What is the impact of COVID-19 on the Z-score of Kenyan commercial banks?

ii. What is the impact of COVID-19 on the capital adequacy of commercial banks in Kenya?

1.4 Research objective

The general objective was to ascertain the impact of COVID-19 on the financial stability of commercial banks in Kenya. The specific objectives of the study are:

i. To investigate the impact of COVID-19 on Kenyan commercial banks' Z-score.

ii. To establish the impact of COVID-19 on the capital adequacy of Kenyan commercial banks.

1.5 Significance of the study

The study gave forth valuable insights on how the financial stability of commercial banks is impacted by the pandemic, facilitating the formulation of appropriate policy measures geared towards stabilizing Kenyan commercial banks during the pandemic by the CBK and the

Government of Kenya (GOK). Finally, the study gives commercial banks in Kenya insights into how best to cushion themselves from exogenous economic shocks generated by pandemics.

1.6 Scope of the Study

How COVID-19 has impacted Kenyan banks' financial stability of commercial banks was the focus of the study. Data was collected from the year 2015 to 2022. Balanced panel secondary data was sourced from 19 commercial banks in Kenya. The choice of the study periods coincides with the period during the pandemic and was also chosen as a result of policy changes in the sector during this period.

1.7 Limitations

Some commercial banks had missing data on the study variables due to mergers, collapse, and being put under receivership. Therefore, only commercial banks which complete data on the study variables were considered. Consequently, the event window was only two years (2020 to 2021) and the only financial actors considered for the study were commercial banks in Kenya therefore, saccos and microfinance banks were not considered.

1.8 Organization of the Study

The study has five chapters. Chapter One introduced the study. The second chapter examined the theoretical and empirical literature. Methodology was explored in chapter three which encompasses the research design, theoretical framework, research design, variable measurement and description, collection, processing, and analysis of data. The fourth chapter evaluated the empirical findings and chapter five explored the summary, conclusions, and policy implications of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, theoretical review, empirical literature, a summary of the empirical literature, and research gaps existing in the empirical literature were explored.

2.2 Theoretical Review

A couple of theories have been put forward to elucidate the link the stability of the financial stability of commercial banks and economic shocks. These theories have been reviewed in the sections that follow.

2.2.1 Financial Intermediation Theory

This is a proponent of Diamond (1984). According to Spratt (2013), financial institutions link surplus and deficit units through financial intermediation. The theory seeks to explain why individuals don't practice direct lending of abundant resources but instead loan to banks who in turn loan to borrowers. By effectually scrutinizing borrowers, banks act as scrutinizing agents. According to the financial intermediation theory, one of the fundamental characteristics of banks is their ability to provide liquidity and subsequently transform risk (Bhattacharya & Thakor, 1993).

Furthermore, financial intermediation theory suggests that during turbulent conditions, banks have the unique advantage of utilizing deposits to fund their liability or even to give out new loans. According to Levine (2005), assessing market circumstances, businesses, and managers before making investment decisions entails significant expenditures. Demand for trustworthy information at an affordable price justifies banks' existence. Banks can portray their unique knowledge by injecting capital into ventures which they are well conversant with (Lelanda & Pyle, 1977).

Investments made by banks can make them more or less stable. The financial intermediation theory expounds on the financial intermediation function of commercial banks in Kenya. Critics argue that the paradigm used by the theory is rooted in the classical theory of perfect markets and intermediation functions are no longer crucial in mature markets. The current study will therefore be anchored on the financial intermediation theory.

2.2.2 Financial instability hypothesis

Hyman Minsky (1992) is the proponent of the Financial Instability Hypothesis (FIH). The theory emphasizes that capitalist economies frequently exhibit cycles marked by periods of inflation followed by severe deflationary periods. According to Minsky (1992), banks have high levels of leverage and give businesses their depositors' money in the hopes that they will eventually generate a surplus cash flow in the future.

The origin of financial crises for all economic units, including businesses and individuals, is explained by three diverse income-debt interconnections (Minsky, 1992). Minsk categorized them as; hedging, speculative, and Ponzi financing. Hedge financing involves taking out loans to invest in profitable opportunities where the borrower has sufficient income coupled with loan repayment ability. Speculative finance involves borrowing money to invest in potentially profitable opportunities when one's income is insufficient to pay back the loan. Ponzi financing is borrowing where the borrower does not have any income or assets with which to repay the debt and instead depends on the increasing value of the investment to repay the loan.

The economy is stable under some financing regimes and unstable under others (Minsky, 1992). Another tenet of the theory of financial instability according to Minsky (1992), is that during prosperous times, the capitalist economic system switches to alternative income-debt relations amid phases of affluence, shifting from stable to unstable. According to Minsky (1992), a

contemporary capitalist economy comprises mainly two stages: stable phases and unstable phases. When the economy is stable, real income often increases, employment increases, and there is a general sense of confidence about the economy and future growth. Economic contractions are severe, characterized by high unemployment, occur during uncertain situations, and the outlook for the economy is gloomy.

Although Papadimitriou et al. (1999) argue that financial crises are endogenously created, they do not, however, rule out that a crisis can be a result of an exogenous occurrence, such as pandemics. The financial instability hypothesis will be crucial to the current study by addressing the general objective of the study.

2.2.3 Capital Buffer Theory

Calem & Rob (1996) introduced the capital buffer theory. Buffer denotes capital that banks retain over the minimum statutory requirements set by the regulator of banking institutions to decrease the likelihood of them failing to meet the set standards (Calem & Rob, 1996). According to Lotto (2017), banks with low capital buffer levels strive to reach the necessary capital buffer level, whereas banks with adequate capital buffer levels strive to retain their capital buffer. These increased capital levels act as buffers against negative shocks, reducing the possibility of bank failure. Lower levels of capital held by banks increase their risk level as well as decrease their capacity to absorb shocks.

Milne & Whalley (2001) argue that financial institutions are swayed to raise their capital levels over the minimum required due to the fines put in place by the oversight bodies on the banks which fail to achieve or keep up the minimum specified capital amount. On the other hand, the monetary authority views violating capital obligations as a violation of banking law which is unacceptable (Calem & Rob, 1999). Particularly, undercapitalized banks over a long time end up being shut

down. Capital is more dependable, and trustworthy, and can be particularly utilized in long-term planning.

According to the capital buffer hypothesis, a bank close to meeting the permissible capital proportions, to avoid financial penalties for failure to meet capital requirements, is incentivized to raise its capital levels to mitigate uncertainty. In contrast, undercapitalized banks could be compelled to engage in risky ventures with the prospect of raising more capital. This is one way whereby the dangers attributed to insufficient capital adequacy have an impact on banking functioning. The capital buffer theory postulates that financial disturbances are best absorbed by banks that hold more capital and keep extending credit to other parts of the economy. The theory emphasizes the role played by the CBK in ensuring adherence to the capital requirement by the commercial banks in Kenya. The capital buffer theory therefore underpins the linkage of capital adequacy of Kenyan commercial banks and COVID-19 which is captured by the study`s second objective.

2.3 Empirical literature

Elnahass et al. (2021) using panel data from 1090 banks explored the COVID-19 outbreak and Global banking stability between 2019 (pre-COVID-19) and 2020 (during COVID-19). Panel data was collected and Z-score was the proxy for financial stability for global banking stability. Ordinary Least Squares (OLS) regression outcome revealed that the financial stability of global banks was significantly harmed by the pandemic. Global banks were explored using OLS estimator in the study. P-VAR was embraced to assess the stability of banks in Kenya in the current study in contrast to the OLS estimator which assessed global banks.

Arafat et al. (2021) examined the Impact of COVID-19 on the Performance and Stability of the Gulf Cooperation Council (GCC) using Conventional and Islamic Banks. Cross-sectional quarterly panel data was collected from 1st January 2019 to 30th June 2020. The performance measures were ROA and (ROE) while Z-score proxied financial soundness. Stability remained the same while performance was negatively impacted by the pandemic. Performance was explored by the researcher in this study. The stability of banks in Kenya was explored in this current study using P-VAR methodology.

Ozsoy et al. (2022) investigated Human Mobility, Relationship Banking, and Bank Performance: Evidence from the Pandemic for United States banks. Bank-quarter observations were collected for 4,649 banks from 2019 to 2020. The financial stability proxy used was Z-score. Fixed effects model regression outcome revealed that United States banks' subjection to limited movement contorted their stability, profitability, and asset quality. The researcher focused on the performance of United States banks using panel regression while in this current study, the impact of COVID-19 on the financial stability of Kenyan commercial banks was investigated.

Riadi et al. (2022) during the Pandemic explored Bank Concentration and Bank Stability (Indonesian 2020 -2021). Monthly unbalanced panel data for commercial banks' financial reports were obtained from the Indonesian Financial Services Authority. Z-score reflected bank stability. The least squares random effect method was used. The fixed-effects model regression analysis revealed the pandemic negatively impacted stability. The study focused on Indonesian commercial banks while employing panel regression, unlike the current study which used panel vector autoregression on banks in Kenya.

Siti et al. (2022) sought to determine whether ownership and bank size matter while assessing COVID-19`s impact on bank stability from March 2020 to March 2021. Regressions analysis

methods used were OLS and random effects model (REM). Results revealed stability was harmed by COVID-19. This research focused on commercial banks in Indonesia in conjunction with OLS and REM regression analysis. P-VAR was embraced to assess the financial stability of banks in Kenya for this current study.

Sunarsih et al. (2022) assessed the stability and risk of Islamic banks (Indonesia) amidst COVID-19 from 2017 to 2020. Stability was based on Z-score. COVID-19 had no impact on banks in Indonesia as per the GMM regression results. Indonesian banks were analyzed using GMM regression. P-VAR was adopted to investigate COVID-19`s impact on the stability of commercial banks in Kenya in this current research.

Tran et al. (2022) examined Banks' financial soundness amidst the COVID-19 pandemic between 2020-2021. Stability was based on Z-score. Bank-level data was obtained from Thomson Reuters Eikon. The regression outcomes of the study indicated that bank stability was negatively impacted by the pandemic. The study concentrated on international banks and the pre-COVID-19 period was not considered. The current study considered the pre-COVID-19 period of the Kenyan commercial banks and used P-VAR analysis.

Banna et al. (2022) conducted a study on Islamic Banking Stability Amidst the COVID-19 Pandemic: The Role of Digital Financial Inclusion (DFI). Unbalanced panel data of 65 Islamic banks from six countries from 2011 to 2020 was collected. The methodologies employed were Two-Stage Panel Least Squares-Instrumental Variables (2SLS-IV) and Two Step System Generalized Method of Moments (2SGMM). Bank stability was measured using sharp ratio and Z-score. The results revealed that DFI led to greater stability during the pandemic. This was a cross-country study, unlike the current study which evaluated Kenyan commercial banks financial stability using P-VAR methodology.

Kimundi (2022) explored COVID-19 Policy Interventions, Credit Vulnerabilities, and Financial (In)Stability. The Bayesian Threshold Vector Autoregressive model was employed for data analysis using data quarterly bank from 2005 quarter one to 2021 quarter two. Financial stability proxies were Asset Quality and Capital Adequacy. Policy intervention had an unprecedented impact on bank soundness. On the contrary, the current study used P-VAR and Z-score to measure stability for Kenyan commercial banks.

Ochenge (2022) examined how bank profitability and stability are affected by revenue diversification amidst the COVID-19 Pandemic in Kenya from 2010 to 2020 using 30 banks. ROA and ROE were employed as profitability measures, whereas the stability measures used were; Z-score, Standard deviation of ROA, and ROE. The GMM results revealed an inverse association between non-interest income and risk but positive in profitability. The researcher used standard deviations of both ROA and ROE as stability measures which are more of profitability measures. The current study used P-VAR methodology and Z-score as the proxy for financial stability.

2.4 Summary of Literature and Research Gaps

The inquiry into COVID-19 and the financial stability of banks has been majorly cross-country studies and country-specific. However, cross- country studies are very aggregated and therefore strenuous to extrapolate any relevant country-specific policies, whereas the country-specific studies were done in the United States and Indonesia which have different geographical, economic, and religious settings from Kenya. The results also don't portray any conclusive outcome which ranges from no impact, to negative, and positive impact.

Locally, the studies that have been undertaken haven't addressed the impact of COVID-19 shock on Kenyan commercial banks' financial stability while embracing P-VAR analysis. Rather, other variables besides COVID-19 were the main focus of the studies by Ochenge (2022) and Kimundi

(2022), which also used different stability proxies and methodologies. Hence, the necessity of this study which embraced the P-VAR to bring to light how the COVID-19 shock impacted the financial stability of Kenyan Commercial banks.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter encompasses the research methodology and design, theoretical framework and model specification of the study, variable measurement and description, collection, processing, and analysis of data.

3.2 Research Design

The study embraced a non-experimental research design. A non-experimental research design was utilized as it doesn't involve the control of the study variables in any way or form by the researcher (Cooper and Schindler, 2014). Panel Vector Autoregression (P-VAR) methodology was embraced to determine the impact of COVID-19 on Kenyan commercial banks without manipulation of the study variables. Data from the 19 Kenyan banks was sourced from CBK`s Bank Annual Supervision Reports from 2015-2022.

3.3 Theoretical Model

The financial intermediation theory anchored this study. Boyd and Runkle (1993) devised a measure to assess market valuation and risk for failure of bank holding companies (BHC) and denotes $\tilde{\pi}$ as profits, A as assets, E as equity, k as -Equity/Assets, $\tilde{r}$ as profits/Assets and a (˜) title denote a random variable. How a Bank Holding Company i performs relative to other Banking Holding Companies is depicted by the Return distribution $(\phi(\tilde{r})$.

The Bank Holding Company i first and second moments are R and S consequently, represented as $(\phi(\tilde{r})$ for empirical testing. Asset market value to its replacement cost ratio is Tobin's q which

integrates R and S into a single performance indicator for purposes of firm comparison to create a single performance indicator.

Returns and risk are the major considerations considered by market investors. By the assertion that failure of a Bank Holding Company fails when profits ($\tilde{\pi}$) exceed equity (E). Then the possibility of failure is captured by equation 3.1.

$p(\tilde{\pi} < -\mathrm{E}) = p(\tilde{r} < k) = \int_{-\infty}^{k} \phi(\tilde{r})\mathrm{d}r.$ ..... (3.1)

Based on this definition of failure, any banking institution will have failed irrespective if it is too large to fail when $\tilde{r}$ (profits/assets) is greater than capital(k). In the occasions when r has a normal distribution equation 3.1 can be expressed as equation 3.2.

$p(\tilde{r} < -k) = \int_{-\infty}^{z} \mathrm{N}(0,1)\mathrm{d}z,$ .....(3.2)

z=(k—ρ)/σ.....(3.3)

ρ = mean of distribution, σ = standard deviation, and z = probability of failure. Z-score measurement was similar to Arafat et al. (2021) and Sunarsih et al. (2022) as shown in equation 3.4.

$$\text{Z-score} = \frac{\mathrm{ROA}_{it} + \mathrm{ETA}_{it}}{\sigma\mathrm{ROA}_{i}} \quad \text{.....(3.4)}$$

Where i is the bank, t is the time (year), ROA_{it} proportion of profit/loss before tax profit to the total asset, ETA_{it} is the ratio of total equity to the total asset, and $\sigma\mathrm{ROA}_{i}$ is bank`s i standard deviation of ROA calculated from 2015 to 2022.

3.4 Model Specification

According to Azam & Siddiqui (2012), the hindrances to stability can be both endogenous and exogenous elements. Firm characteristics denote endogenous variables such as; capital adequacy

(Karminsky & Kostrov, 2014); ROA and ROE (Trujillo, 2013); and Asset quality (Bowa, 2015). Exogenous factors, on the contrary, are those factors outside the firms and include the external environment (Azam & Siddiqoui, 2012). The exogenous factor for the study was COVID-19, as used by Sunarsih et al. (2022). Therefore, the estimated model was linear as shown by equation (3.5) which captured objective one.

ZS= f (ROE, CAP, AQ, COVD) ……..……..(3.5)

Where ZS is financial stability represented by Z-score, ROE is the proportion of profit/loss before tax to total shareholders' funds, CAP is capital adequacy, AQ is Asset Quality and COVD is COVID-19.

To analyze objective two, equation (3.6) was employed.

CAP = f (ROE, ROA, AQ, COVD) ……...…… (3.6)

Capital adequacy is determined by Asset quality and ROA (Bishnu, 2020), ROE (Setiawan & Muchtar, 2021), and COVID-19 (Hasan & Pareek, 2022).

Where CAP is Capital adequacy, ROA is profit/loss before tax divided by total assets, ROE is the proportion of profit/loss before tax to total shareholders' funds, AQ is Asset Quality and COVD is COVID-19.

3.4.1 Panel Vector Autoregression

Fixed effect models, random effects models, and OLS cannot yield consistent and efficient parameters as they are unable to deal with the endogeneity problem (Ochenge, 2022). Therefore, to analyze equations 3.5 and 3.6, Panel Vector Autoregression (P-VAR) methodology was applied, originating from the works of Love & Zicchino (2006). P-VAR similar to Vector Autoregression (VAR) considers the variables to be dependent on each other thereby facilitating the estimation of interlinkages between them (Canova & Ciccarelli (2013). Also, according to Grossmann et al.

(2014), limited theoretical information is needed to specify the P-VAR model, it deals with endogeneity problems as all the variables are considered to be endogenous, and finally by exploiting both time-series and cross-sectional data, it makes full use of available data.

Therefore, panel vector autoregression was applied in this study. The P-VAR model was specified as;

$$\mathrm{Y_{it}} = \mathrm{Y_{it-1}A_1} + \mathrm{Y_{it-2}A_2} + \ldots\ldots Y_{it-p}A_p + \mathrm{X_{it}B} + \mathrm{e_{it}} \quad \text{..(3.7)}$$

where *i* = *1*, ..., *N* indicates the bank and *t* = time (2015 to 2022), $\mathrm{Y_{it}}$ = endogenous variables captured by 1 x k vector, $\mathrm{X_{it}}$ = exogenous covariates of 1 x m vector, $\mathrm{e_{it}}$ =errors (idiosyncratic), and parameters to be measured are A_1, A_2, … A_p.

$\mathrm{Y_{it}}$ is a vector of ROE, ROA, Asset Quality (AQ), ZS is Z-score, capital adequacy (CAP), and COVID-19 (COVD).

3.5 Definition and measurement of variables.

Table 3:1: Variable Measurement and Definition

Variable	Description	Measurement
Z-score	Refers to banks` probability of insolvency.	A Ratio $\text{Z-score}=\frac{\text{ROA}_{it}+\text{ETA}_{it}}{\sigma\text{ROA}_i}$
ROA	Represents the percentage of profit/loss before tax divided by total assets.	A Ratio $\frac{\text{Profit/loss before tax}}{\text{Total assets}}$ X 100
ROE	Percentage of profit/loss before tax divided by total shareholders' funds.	A ratio $\frac{\text{Profit/loss before tax}}{\text{Total Shareholder's Funds}}$ X 100
Capital Adequacy	Percentage of the ratio of core capital to total deposits	A Ratio $\frac{\text{Core Capital}}{\text{Total Deposits}}$ X 100
Asset Quality	Percent of the Gross non-performing loans divided by total loans.	A Ratio $\frac{\text{Gross non}-\text{performing loans}}{\text{Total loans}}$ X 100
COVID-19	This is a dummy variable that took the value of 1 in 2020 and 2021 and or zero otherwise.	Cardinal

Source: Author

3.6 Data Collection

An event study technique was employed in data collection. World Bank (2022), terms an event study as a mathematical tool technique for determining the outcome of an event on an outcome of interest; data is collected before and after the event or in combination with the time around the event. Annual bank-level panel data was collected on 19 Kenyan banks from 2015 to 2022. 2015 to 2019 was the span before the event (COVID-19), 2020 to 2021 was the event window, and 2022 was the spell after the event. The data was sourced from the CBK.

The project explored 19 commercial banks in Kenya from 2015 to 2022 which had complete data on all the study variables. As of December 2022, Kenya had 39 commercial banks classified into three peers (large, medium, and small) using a weighted composite index (CBK, 2022). The arrival at 19 banks resulted from many banks being put under receivership, collapse, mergers, rebranding, and lack of data on the study variables for some of the commercial banks. The large peer had 7 banks, the medium peer had 4 banks, and the small peer had 8 banks adding up to 19 banks from all the three bank peers making it a proper representation of the banking sector. Secondary bank-level data from the CBK between 2015 to 2022 was used.

3.7 Data Processing and Analysis

Secondary panel bank-level data sourced from the CBK`s Bank Annual Supervision reports was keyed in an excel spreadsheet The data was then imported into Stata version 18; descriptive and diagnostic tests were run, and P-VAR analysis was done to meet the study`s objectives.

3.8 Diagnostic Tests

3.8.1 Panel Unit Root

P-VAR models require that all data be stationary. Levin et al. (2002) introduced the Levin-Lin-Chu (LLC) test which assessed panel unit root. Since P-VAR runs a GMM estimator, the presence

of unit roots renders the moments irrelevant. The null hypothesis: panel contain unit roots, is only rejected when the P-value is less than 0.05. Non-stationary variables will be differenced only once to make them stationary.

3.8.2 Multicollinearity

The presence of multicollinearity is a consequence of correlation between two or more endogenous variables Woolridge, 2012). Multicollinearity was assessed using the variance inflation factor (VIF) test whereby a VIF of above 10 indicates the presence of multicollinearity problem. Since multicollinearity leads to an increase in the standard errors of the regression coefficient estimates, variables that had multicollinearity problems were dropped from the study.

3.8.3 Heteroskedasticity

Heteroskedasticity occurs when the error terms of observation don't have a steady variance (White, 1980). The heteroskedasticity test was detected using the Breusch-Pagan / Cook-Weisberg test. Ho: constant variance of error terms. The presence of heteroskedasticity results in biased coefficient estimates. Heteroskedasticity can be addressed by converting the numeric variable to their natural logarithms.

CHAPTER FOUR

EMPIRICAL FINDINGS

4.1 Introduction

The study utilized CBK Bank supervision Annual Reports data from 2015-2022 for the 19 commercial banks in Kenya (across the three peers) which had complete data on all the study variables. This chapter outlines the descriptive statistics, diagnostic tests, panel vector autoregression analysis, and impulse response functions (IRFs).

4.2 Descriptive statistics

Mean, maximum, minimum, and standard deviation encompass descriptive statistics. The outcome of the study variables (Z-score, capital adequacy (CAP), ROA, ROE, asset quality (AQ), and COVID-19 (covid_dummy)) are presented in Tables 4.1 for the period without COVID-19, whereas Table 4.2 is the period with COVID-19.

Table 4. 1: Descriptive statistics for the period without COVID-19

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Z-score	114	25.6742	12.1388	2.9138	54.2768
ROE	114	18.8256	11.0244	1.2283	47.1922
CAP	114	22.1246	7.4219	9.2000	50.9000
AQ	114	11.5155	7.3024	1.4054	43.9679
ROA	114	3.1584	1.7740	0.3554	7.4021
Covid-dummy	114	0	0	0	0

Source: Author computations

Table 4.2: Descriptive statistics for the period with COVID-19

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Z-score	38	24.3525	12.7545	2.8447	51.5049
ROE	38	13.8222	9.2603	0.4970	38.5733
CAP	38	21.0447	7.6993	8.20000	38.6000
AQ	38	14.4211	6.6133	1.8971	33.6979
ROA	38	2.2989	1.4676	0.1103	5.1478
Covid_dummy	38	1	0	1	1

Source: Author computations

The total observations were 152 from 19 commercial banks over eight years from 2015-2022. Financial stability based on Z-score had a mean of 25.6742 in the period without COVID-19, 54.2768 percent was the maximum value, 2.9138 percent was the minimum, and 12.1388 was the standard deviation as shown in Table 4.1. Z-score during the COVID-19 pandemic dropped to a mean of 24.3525, 51.5049 percent was the maximum, 2.8447 percent was the minimum, and 12.7545 the standard deviation as shown in Table 4.2. Z-score is dependent on ROA which declined during the pandemic as commercial banks' profits declined due to business closures and disruptions during the pandemic.

In the period without the pandemic, the mean ROE was 18.8256 percent, 47.1922 percent was the maximum, 1.2283 percent was the minimum, and 11.0244 standard deviation according to Table 4.1. On the contrary, during the pandemic, the mean ROE declined to 13.8222 percent, a maximum of 38.5733 percent, a minimum of 0.4970 percent, and 9.2603 was the standard deviation according to Table 4.2. The decline in ROE was brought about by reduced profits as businesses

closed during the pandemic. Capital adequacy in absentia of COVID-19 mean was 22.1246 percent, 9.2000 percent was the minimum, 50.9000 percent was the maximum, and 7.4219 was the standard deviation as shown in Table 4.1. During the pandemic, capital adequacy declined to 21.0447 percent, the maximum value was 38.6000 percent, the minimum value was 8.2000 percent, and the standard deviation was 7.6993 according to Table 4.2. Core capital violations by commercial banks during the pandemic led to a decline in capital adequacy.

Asset quality mean value before the pandemic was 11.5155 percent, the minimum value was 1.4054 percent, 43.9679 percent was the maximum, and the standard deviation was 7.3023 according to Table 4.1. Table 4.2 displays that during the pandemic, asset quality worsened to a mean of 14.4211 percent, a minimum of 1.8971 percent, a maximum of 33.6979 percent, and the standard deviation was 6.6133. The pandemic created challenges in loan repayments for businesses, individuals, and corporations which worsened the asset quality.

Table 4.1 displays that the mean ROA in the absence of COVID-19 was 3.1584 percent, the maximum value was 7.4021 percent, the minimum value was 0.3554 percent, and the standard deviation was 1.7740. On the contrary, ROA during the pandemic declined to a mean value of 2.2989 percent, the maximum value was 5.1478 percent, the minimum value was 0.1103 percent, and the standard deviation was 1.4676 as shown in Table 4.2. Business closure during the pandemic meant less profits for banks and ultimately a decline in ROA. Covid_dummy (COVID-19) in the period before the pandemic had a value of 0 for the mean, standard deviation, minimum, and maximum. On the contrary during the pandemic, Covid-dummy had a value of 1 for the mean, maximum, and minimum but a standard deviation of 0.

4.3 Diagnostic tests

Akin to Abrigo and Love (2016), the study variables were converted into logarithms before data analysis commenced. The outcome of the panel unit-root test and multicollinearity test are outlined below.

4.3.1 Panel unit-root test

Table 4.3: Panel unit-root test

VARIABLE	TEST	P-VALUE
log_z-score	LLC	0.0000
log_capital adequacy (cap)	LLC	0.0000
log_roa	LLC	0.0000
log_roe	LLC	0.0000
log_asset quality (aq)	LLC	0.0000
log_ (covid -dummy)	LLC	0.0000

Source: Author computations

P-VAR requires the data to be stationary at level or first difference. The presence of panel unit root was assessed using LLC test. P-VAR runs a GMM estimator therefore, the presence of unit roots renders the moments irrelevant. The results for the study variables; Z-score, capital adequacy CAP), COVID-19(covid-dummy), asset quality (AQ), return on assets (ROA), and return on equity (ROE) all had a p-value < 0.05 as shown in table 4.3. Therefore, the null hypothesis: Panels contain unit roots was rejected. This implies that the variables were stationary at level. Since the panel unit roots were stationary, the GMM moments are relevant.

4.3.2 Multicollinearity test

The outcomes of the multicollinearity test based on VIF are presented in Tables A.1 for equation 3.5, and both Tables A.2, and A.3 for equation 3.6 in the appendix. Multicollinearity leads to an increase in the standard errors of the regression coefficient estimates. Table A.1 displays that multicollinearity is not a problem since variables have a VIF of less than 10. VIF less than 10 indicates the absence of multicollinearity problem (Myers, 1990). On the contrary, in Table A.2, multicollinearity is present in ROA (13.53) and ROE (12.92) as the variables have a VIF of more than 10. Due to the multicollinearity problem, the researcher dropped ROA and ROE variables to address the problem. Table A.3 shows the VIF results for equation 3.6 after dropping the ROE and ROA variables, whereby the multicollinearity problem is addressed as all the variables have VIF values below 10. As a result, no increase in the standard errors of the regression coefficient estimates was experienced.

4.4 Panel Vector Autoregression Analysis

4.4.1 Lag length selection

Table 4.4: Optimal lag length selection

Lag	CD	J	J pvalue	MBIC	MAIC	MQIC
1	0.9997959	24.56516	0.5988168	-84.59723	-29.43484	-50.87282
2	0.99983	19.50743	0.3612219	-53.26749	-16.49257	-30.78456
3	0.9998661	7.36337	0.5993433	-29.02409	-10.63663	-17.78262

Source: Author computations

Before the P-VAR model analysis, the model's optimum lag length is established. This step helps determine the appropriate time frame to capture the dynamics of the variables. Andrews and Lu (2001) devised the three-model selection criterion for lag length selection. One order lag (one lag) P-VAR was selected as evidenced by Table 4.4 where MBIC, MAIC, and MQIC reach their minimum values.

4.4.2 Model Stability

Table 4.5: Eigenvalue stability condition for equation 3.5

Eigenvalue		
Real	Imaginary	Modulus
-1.423776	0	1.423776
0.8588663	0	0.8588663
0.4441758	0.1765474	0.477976
0.4441758	0.1765474	0.477976
-0.4305323	0	0.4305323

Source: Author computation

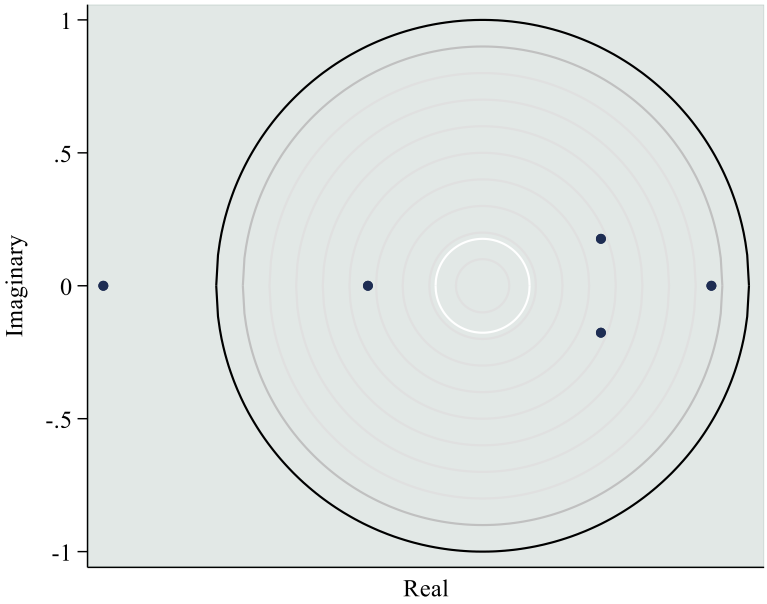

Figure 4.1: Root of companion matrix for equation 3.5
Source: Author computation

Table 4.6: Eigenvalue stability condition for equation 3.5

Eigenvalue		
Real	Imaginary	Modulus
-.0480356	-0.8027936	0.8042295
-.0480356	0.8027936	0.8042295
0.5032514	0	0.5032514
0.3774144	0	0.3774144

Source: Author computation

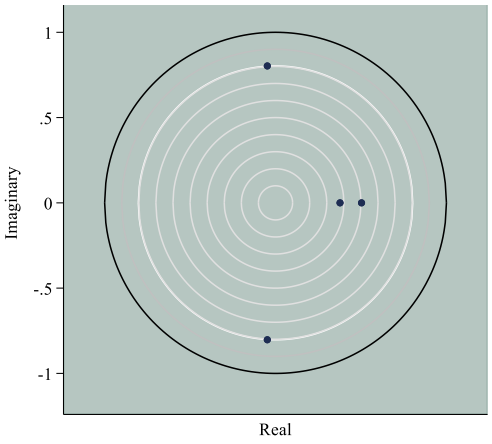

Figure 4.2: Root of the companion matrix for equation 3.5
Source: Author computation

Table 4.7: Equation 3.6 Eigenvalue stability condition

Eigenvalue		
Real	Imaginary	Modulus
0.1931895	0.7021236	0.7282168
0.1931895	-0.7021236	0.7282168
0.3216948	0	0.3216948

Source: Author computation

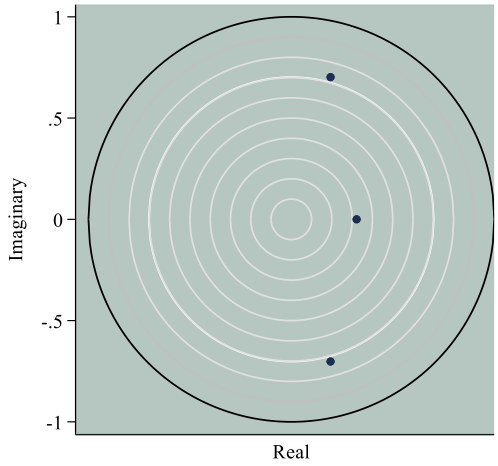

Figure 4.3: Root of the companion matrix for equation 3.6
Source: Source: Author computation

The stability condition of the P-VAR necessitates the moduli of the eigenvalues of the dynamic matrix to lie inside the unit circle. Table 4.5 shows that equation 3.5 does not satisfy the stability condition as one value lies outside the unit circle which is further emphasized by Figure 4.1. The

ROE variable was thus dropped as shown in Table 4.6 and Figure 4.2. All variables lie within the unit circle and the stability condition was satisfied. Table 4.7 shows the stability condition for equation 3.6 is satisfied as all the eigenvalues lie within the unit circle. Figure 4.3 supports this claim of stability.

4.4.3 Heteroskedasticity test

Table 4.8: Equation 3.5 Heteroskedasticity test

Breusch–Pagan/Cook–Weisberg test
H0: Constant variance
chi2(1) = 0.56
Prob > chi2 = 0.4553

Source: Author computations

Table 4.9: Equation 3.6 Heteroskedasticity test

Breusch–Pagan/Cook–Weisberg test
H0: Constant variance
chi2(1) = 0.57
Prob > chi2 = 0.4512

Source: Author computations

The Breusch–Pagan test was employed to test for heteroskedasticity. The null hypothesis was accepted as the p-value > 0.005 indicating the absence of heteroskedasticity problem (constant

variance) for both equations 3.5 and 3.6 as shown in tables 4.8 and 4.9 respectively. This ensured that the coefficient estimates were unbiased.

4.5 Impulse Responses Functions

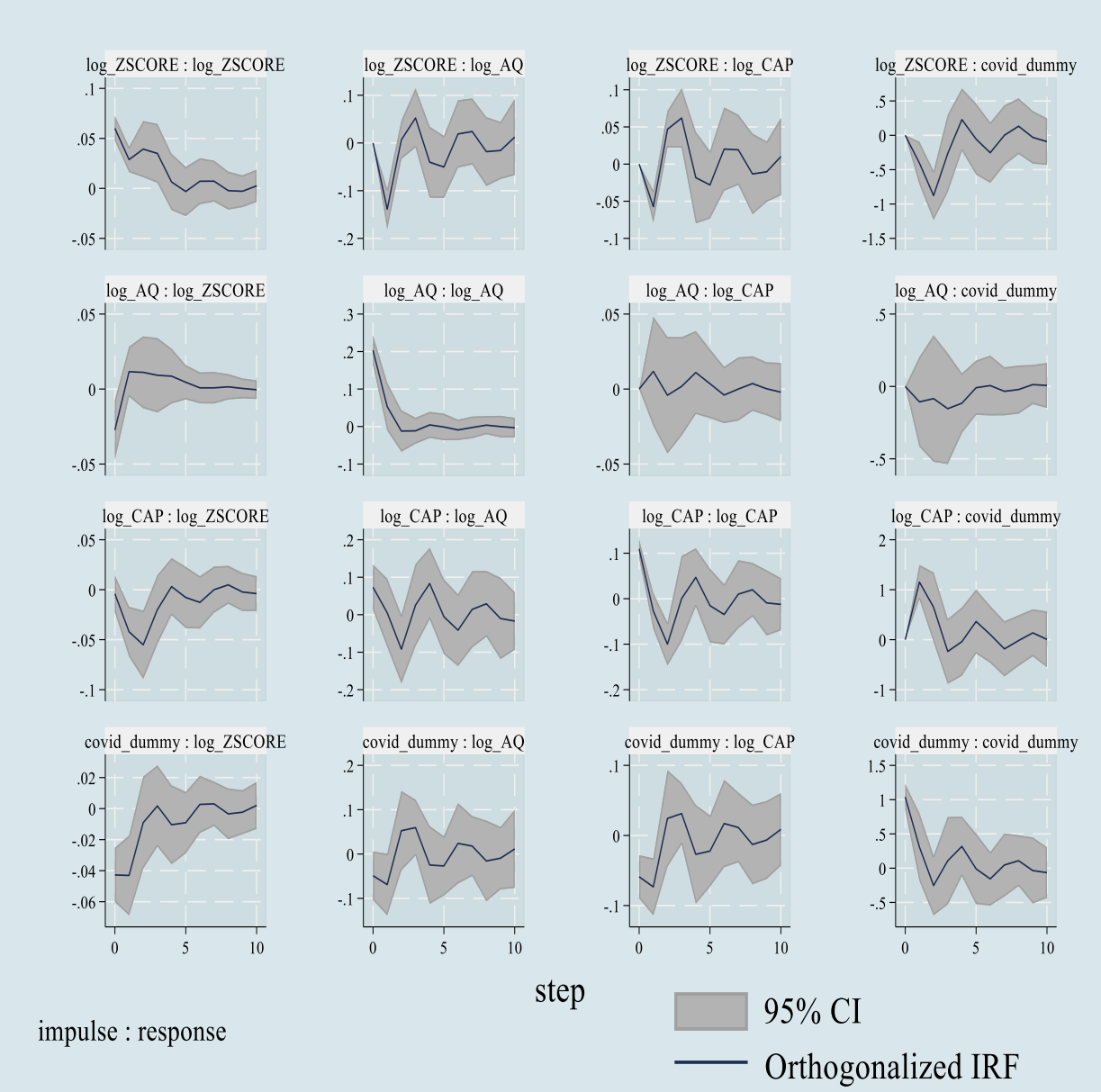

Figure 4.4: Impulse Response Functions for Objective One

Source: Author computation

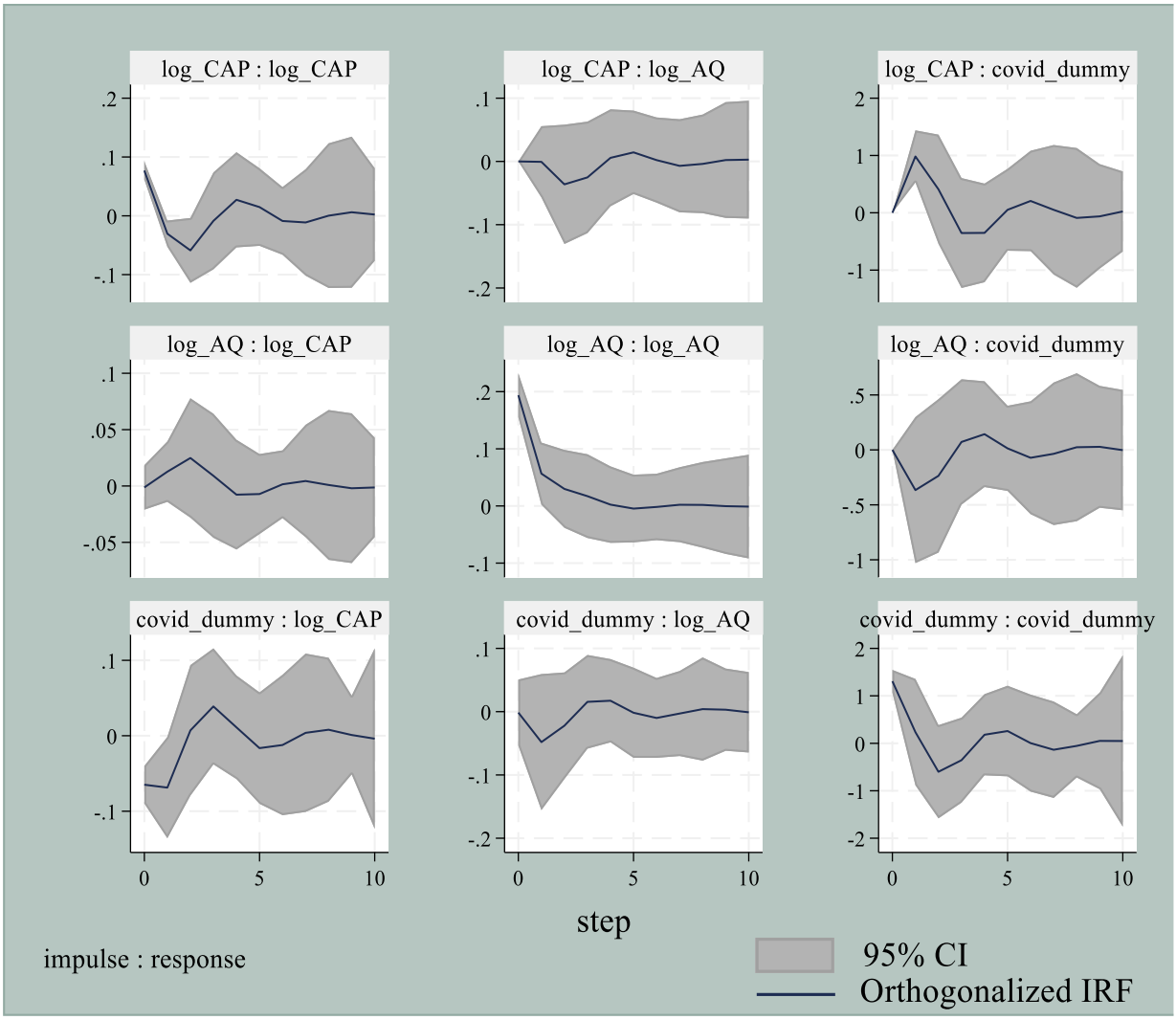

Figure 4.5: Impulse Response Functions for Objective Two

Source: Author computation

After the appropriate lags were established and the stability condition was satisfied, the researcher generated the Impulse Response Functions (IRFs). The P-VAR results are rarely interpreted by themselves; rather, most researchers are often interested in the IRFs. The IRFs generate the impact of one variable in the system to innovations in another variable while holding all other shocks at zero and are utilized to observe the dynamic interactions between variables. Consequently, the standard errors of the IRFs and the confidence intervals are generated using Monte Carlo

simulations (Garita, 2011). IRFs were generated using Monte Carlo simulations with 200 repetitions over the next 10 years. By orthogonalizing, the more exogenous variables appear first in the P-VAR equation. The first variable represents the impulse variable while the second variable is the response variable.

Figure 4.4 outlines the results of the impulse response for objective one. The impulse responses show that one standard deviation shock of COVID-19 on Z-score negatively impacted the financial stability of Kenyan commercial banks which wears out after 10 years. This is shown in Figure 4 in column 1 row 4. This outcome is akin to the findings of Elnahass et al. (2021) who used OLS regression analysis to analyze global banks, Riadi et al. (2022) who utilized the least squares random effects model to study Indonesian banks, and Siti et al. (2022). However, Sunarsih et al. (2022) using GMM regression discovered that the pandemic had no impact on the financial stability of Islamic Indonesian banks. The pandemic generated disruptions in the financial intermediation process as lockdowns and quarantines were instituted hindering movement and causing business closure. This meant that savers and borrowers could not reach banks and ultimately this led to financial instability as banks' profits dwindled. This is supported by the financial intermediation theory.

For objective two, capital adequacy was negatively affected by COVID-19 as shown in Figure 4.5 column 1 row 3. This implies that a one standard deviation shock of COVID-19 negatively impacted the capital adequacy of commercial banks in Kenya. The impact wears out after 10 years. Similar results were obtained by Tran et al. (2022) who utilized the fixed effect model to study United States and non-United States banks. Based on the capital buffer theory, banks are supposed to adhere to the capital adequacy requirements set by the regulations. During the pandemic, some

banks failed to adhere to the capital adequacy requirements set by the CBK. This led to capital adequacy of banks being negatively impacted by the pandemic.

CHAPTER FIVE

SUMMARY CONCLUSION AND POLICY IMPLICATIONS

5.1 Introduction

The summary, conclusions, policy implications, and areas for further research are presented in this chapter.

5.2 Summary

The study explored the impact of COVID-19 on the financial stability of commercial banks in Kenya. Specifically, the impact of COVID-19 on both Z-score and capital adequacy. The research project was undertaken since the concerted efforts by the CBK, MPC, and GOK to prevent the crisis from turning into a financial crisis in Keny; ROE fell to 2.07 percent in 2020 its lowest ever, and asset quality deteriorated to its worst value of 14.5 percent in 2020. The two objectives of the study were: To investigate the impact of COVID-19 on Kenyan commercial banks' Z-score and to establish the impact of COVID-19 on the capital adequacy of Kenyan commercial banks.

P-VAR was embraced since both fixed and random effects models cannot yield consistent and unbiased results. The study differentiated itself from other studies by utilizing P-VAR and event study methodology in data collection. Furthermore, the study investigated the impact of the pandemic on Kenyan commercial bank`s Z-score and capital adequacy which remains largely unexplored. A non-experimental research design was employed on the 19 commercial banks in Kenya which had complete data on all the study variables. Secondary panel data was obtained from the CBK`s annual supervision reports from 2015 to 2022. The outcome of the P-VAR IRFs revealed that COVID-19 negatively affected the Kenyan commercial bank`s Z-score and capital adequacy. Hence, the pandemic adversely impacted the financial stability of Kenyan commercial banks.

5.3 Conclusion

The study concluded that, in the occasions of pandemics, the financial stability of Kenyan commercial banks is bound to be compromised and hindered. In the case of COVID-19, this was partly due to the shock that emanated from the pandemic which occasioned the government to institute partial lockdowns and travel restrictions. These government interventions made businesses collapse making it particularly hard to operate and this impact trickled down to commercial banks in terms of reduced profits. Therefore, Z-score the financial stability proxy was negatively impacted by COVID-19 as depicted by the IRFs which addressed the first objective of the study. Likewise, the IRFs depicted a scenario whereby the pandemic negatively impacted the capital adequacy of Kenyan commercial banks which is the second objective of the study. Failure by some commercial banks in Kenya to adhere to the capital adequacy requirements made the banks susceptible to economic shocks such as the one caused by COVID-19.

5.4 Policy Recommendations

The study's outcome revealed that the pandemic negatively impacted commercial banks in Kenya. The financial stability proxy Z-score is based on ROA which is a profitability measure. Therefore, the GOK ought to institute non-disruptive pandemic control measures such as proper hygiene and wearing of masks (in the case of COVID-19) as opposed to quarantines and lockdowns which affect the commercial banks' operations and also other businesses ultimately leading to a decline in income for banks. The use of masks and adopting proper hygiene measures won’t affect businesses. This will ensure banks' incomes will be uninterrupted and hence their financial stability. The capital adequacy of Kenyan commercial banks was similarly negatively impacted by the pandemic. Since capital acts as a shock absorber for banks, Kenyan commercial banks should strive to achieve and maintain the minimum capital adequacy ratios set by the CBK. This will

ensure that the commercial banks in Kenya cushion themselves against economic shocks generated by pandemics such as COVID-19. By adhering to the capital adequacy requirements set by the CBK, banks will be better positioned to absorb economic shocks.

5.5 Areas for Further Study

This paper has brought to light the impact of COVID-19 on the financial stability of commercial banks in Kenya using P-VAR. Future studies can focus on other financial actors in the Kenyan economy such as saccos and microfinance banks. Additionally, a different financial stability proxy can be adopted for instance the fragility index coupled with time series data.

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APPENDICES

APPENDIX A: TABLES

Table A.1: Equation 3.5 Multicollinearity Test

Variable	VIF	1/VIF
log_ROE	1.60	0.625890
log_AQ	1.55	0.643689
log_CAP	1.13	0.886828
covid_dummy	1.06	0.943039
Mean VIF	1.33	

Source: Author computations

TableA.2: Equation 3.6 Multicollinearity Test

Variable	VIF	1/VIF
log_ROA	13.53	0.73885
log_ROE	12.92	0.077421
log_AQ	1.50	0.666525
covid_dummy	1.06	0.946004
Mean VIF	7.25	

Source: Author computations

Table A.3: Multicollinearity Test for Equation 3.6

Variable	VIF	1/VIF
log_AQ	1.04	0.963918
covid_dummy	1.04	0.963918
Mean VIF	1.04	

Source: Author computations

Table A.4: List of commercial banks used in the study

Commercial Banks
Peer (Large)
Equity Bank Kenya Ltd
KCB Bank Kenya Ltd
Co-operative Bank of Kenya Ltd
Standard Chartered Bank Kenya Ltd
I&M Bank Ltd
Stanbic Bank Kenya Ltd
Diamond Trust Bank Kenya Ltd
Peer (Medium)
Bank of India
Prime Bank Ltd
Citibank N.A. Kenya
Bank of Baroda (Kenya) Limited
Peer (Small)
Guaranty Trust Bank
Gulf African Bank Ltd
Habib AG Zurich
Paramount Bank Ltd
Guardian Bank Ltd
African Banking Corporation Ltd

Development Bank of Kenya
M-Oriental Commercial Bank Ltd